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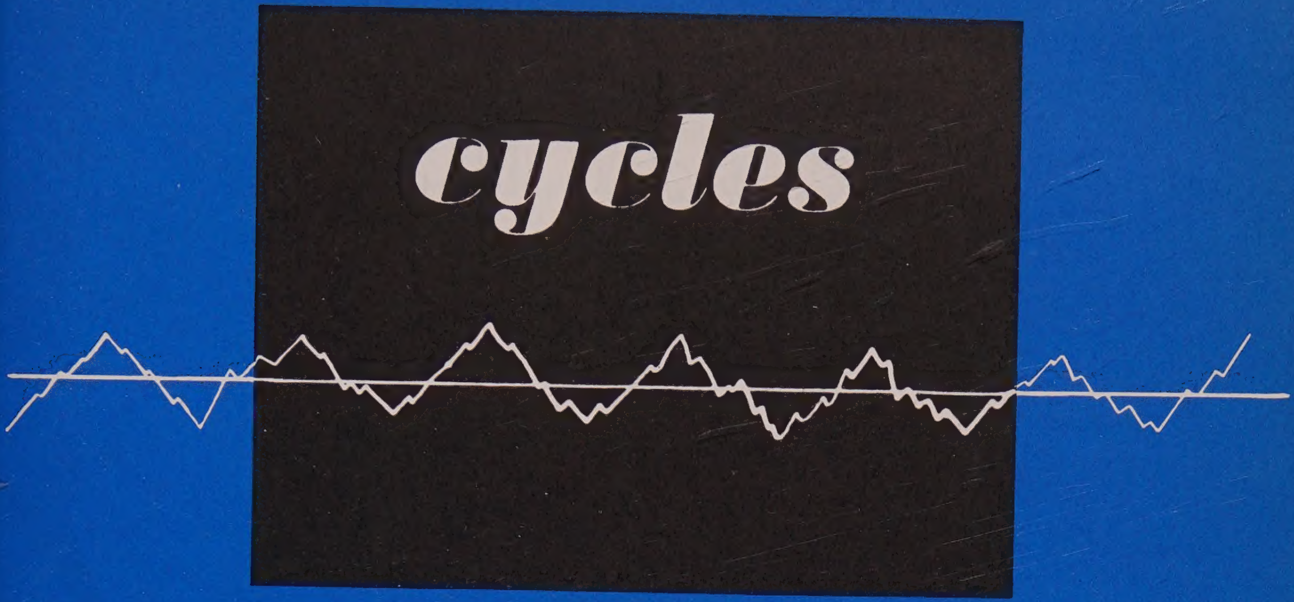

August 1961

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cycles

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Cycles are only *one* of the forces you must consider if you are attempting economic forecasting.

If you ignore the cycles you run the risk of serious errors.

But unless you study and weigh all the *other* forces that, in addition to cycles, combine to create economic change, you will make grave mistakes.

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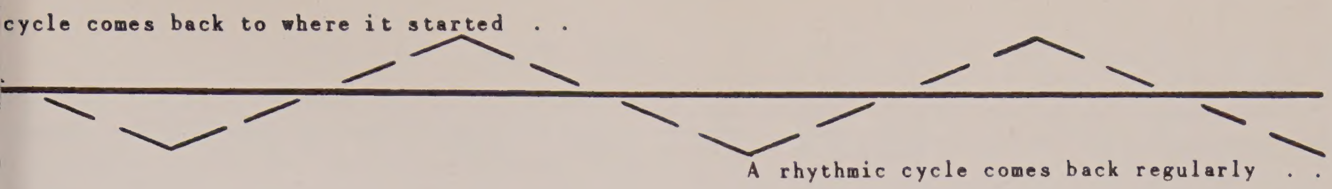

cycle comes back to where it started . .
A rhythmic cycle comes back regularly . .

THE DIRECTOR'S LETTER

Dear Member:

As I have mentioned a number of times, I am concerned about the inability of ordinary human beings, such as you and I, to comprehend the astronomical figures that are involved when we have to consider national and international problems.

Emotionally, for me, a thousand is merely a big number, a million is a bigger one, a billion a bigger one still. Unless I translate into more meaningful concepts, the proper emotional impact of these labels is lacking.

Anything that helps to reduce to workable proportions the enormous numbers that we must deal with is all to the good. To this end I have suggested to you the concept of America-in-a-nut-shell and World-in-a-nut-shell.

There is another concept that I think you can use to simplify the complexities of international relations. I refer to thinking of each nation as a separate family. (I have spoken of this before, but the idea lends itself to further elaboration.)

To make the concept a little more realistic, think of "family" in a patriarchal sense. A group with many sons and daughters, in-laws, slaves perhaps; or even, if you prefer, a closely knit organization of people such as an English manor.

Imagine yourself as "Uncle Sam," the patriarch of the family farm known as U. S. A. Round about are other family farms known as Liberia, Bolivia, Cuba, Laos, Formosa and the like. Personalize these families if you like, also.

Let's refine the picture a little. How many people do you see as living on your farm or manor? 44 or so? That would be maybe yourself, your wife, and eight or nine sons and daughters and their families. Not too many for a patriarch like you! At this scale there would be about 680 on the other farms near by. Of course some of these farms, like yours, are prosperous, but the great majority of them are not. Let's say 190 people who are reasonably comfortable, 490 barely getting by. Of these latter, there would be 50 or so white, 60 or so black, and about 380 yellow—but what does color matter?

For a breakdown of the world population into parts and reduced to the levels spoken of here see the figures on page 204.

Picture *your* farm as having every comfort and luxury: commodious and well painted buildings, all modern gadgets, autos, farm machinery, warm and stylish clothes, liquor, tobacco, and cosmetics, sleek cattle, bursting granaries, and modern medicine, all in abundance.

In contrast, many of the farms 'roundabout are peopled by families that have *nothing*. So little furniture and shelter that some of the families sleep six or seven to a bed. So little clothing that in winter they are always cold. So little food that they are dying of starvation. So little medicine that they mostly have yaws, tuberculosis, and other terrible diseases.

One of these families wants to borrow $125. ($500,000,000) Would you lend it?

Another family does not ask for anything, but it wants to trade what it has (rice, wool, or what not) for what it needs—let us say medicine. Would you set up tariff barriers to make trading harder or impossible?

One old bachelor named Castro, who has been using some of your tools, decides to steal them. Would you let him get away with it?

Another family is at your doorstep begging. Will you give?

I don't know that I'd blame you if you went easy on alms. The task of relief is so hopeless. But I do think that, *in your own self interest,* you should do something to make these neighbors of yours self-supporting on some sort of a decent basis. "Decent" is of course a relative term. The way that these people live now would be "decent" if you did not live so much better. It is the *disparity* of living conditions that is the problem.

Do you think you might lend a dozen books? Or give a few hoes and sickles and improved seeds? Or spare one of your own sons to go from neighbor to neighbor to teach your know-how? Or even take in one or two neighbor boys to learn your farming techniques first hand?

Suppose you, as patriatch, thought the book idea was a good one. You decide to lend or give away a dozen books. In real life that would be 48,000,000 volumes!

Suppose you decided to send one of your sons out to help. A "Peace Corps," if you will. Translating this into actuality, 1/44 of 177,000,000 U. S. A. population calls for a corps of 4,000,000 people! (A Peace Corps of 500 people in real life would amount to one man for 15 minutes in the patriarchal world of our imagination!)

Suppose you decide to accept two of the 500 underprivileged on your farm each year for education and training. Would that be too many? In real life that would be 8,000,000 in constant rotating attendance!

Who would teach these visitors? If you devoted one and a half hours a day of one member of your family to the job, in real life it would take half of all the teachers in all the public schools!

"Preposterous!" I hear you say. Granted. But what *would* you do, as patriarch of a family of 44, in a world of 725 people. 500 of whom were at or near the bare subsistence or starvation level (and no police protection)? Whatever you decide, multiply it by 4,000,000 to activate your program in real life.

No Easy Answers

The problem has no easy answers. You have an obligation to your own family. The collective population of all the other families is 15 times as great as yours. If you emptied all your granaries, most of the others would still be hungry. *All* your medicine and the *full* time of your doctor-son (now overworked at home) would do but little toward adequate health for all. Moreover, insofar as health and life expectancy were improved, the starvation problem would be increased in proportion. Remember that the area of these various farms is fixed.

Moreover, there is good reason to believe that, in the long run, most of the help you could give would do more harm than good. This is particularly true of medical help that preserves life and thus contributes to the population pressure. Food, too, by keeping people from dying of starvation, increases the number of mouths that have to be fed in the future and therefore, like medical aid, in time, will *lower* the standard of living. Even better agriculture, unless accompanied by birth control, would probably be of no permanent value.

(Free, harmless, birth control pills would do more for the peace of the world and the welfare of mankind than any other single thing that could be done. Development of such pills and their free distribution is, in my opinion, hundreds of times as important as cancer research.)

I'm not concerned here in trying to tell you what to do. I don't know. I'm merely presenting a gimmick that will help you to develop your own answers, or to judge in proper perspective the courses of action proposed by others. However, I do think you ought to do something. In fact, in terms of long-range self-interest, I think you—we, all of us—have *got* to do something. Not to buy good will, but to eliminate the disparaties. With movies, radio, television, increased communication, increased literacy, we are becoming really one world. And in one world disparities must be held within limits or else we will find ourselves in a situation like that o the French nobility at the time of the Revolution, or the Russian nobility in 1917. We are sitting on a powder keg, my friend, and time is running out!

Cordially yours,

Edward R. Dewey

Director

THE YEARLY CYCLE IN THE PRICE OF FEDDERS–QUIGAN COMMON STOCK

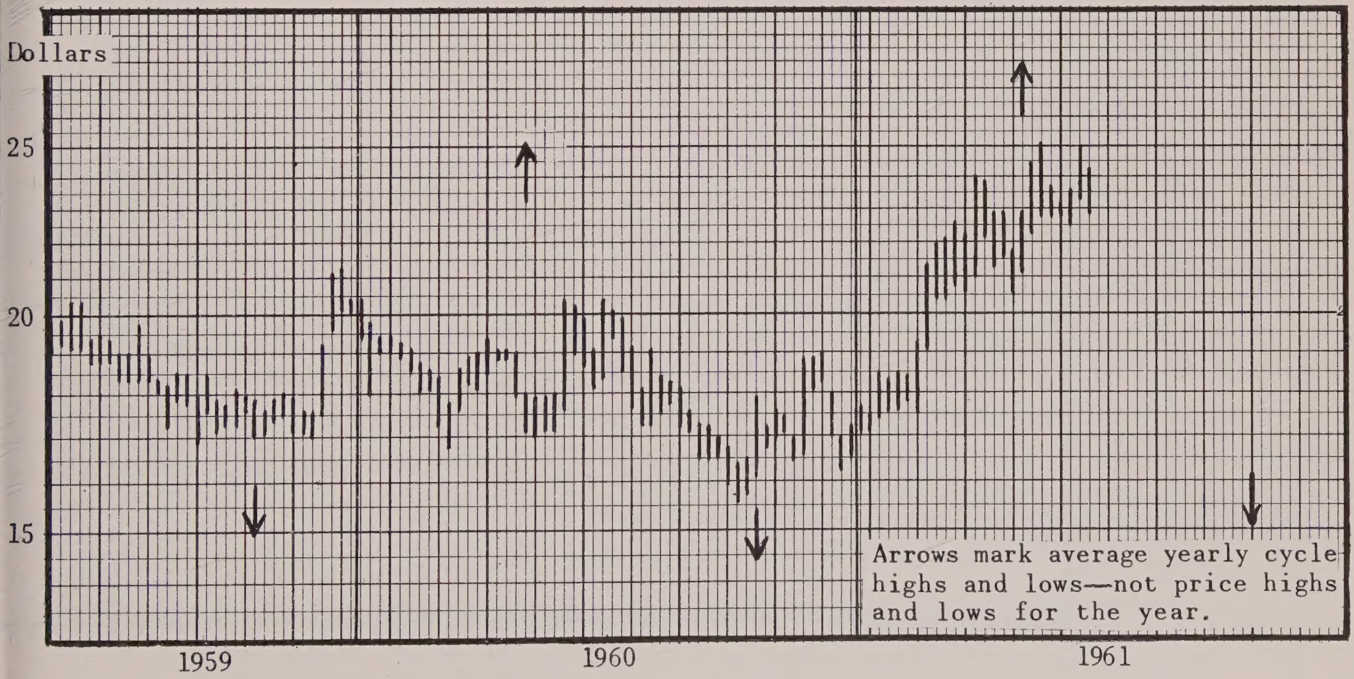
by Gertrude Shirk

After we published the story on the yearly cycle in Carrier Corporation common stock in the February 1961 issue of *Cycles*, a member (George B. Seager of New York) suggested that we might find a similar cycle in other "hot weather" stocks such as Fedders-Quigan or Coca-Cola.

A study of Fedders-Quigan has revealed that a yearly cycle has indeed been present in the average weekly price over the period for which we have data, October 1951 to date. This yearly cycle has had a crest at the 18th week of the year, and a trough at the 42nd week of the year, on the average, since 1951. It has had an average strength of 11% above the yearly trend at the time of crest, and 10% below the yearly trend at the time of the trough.

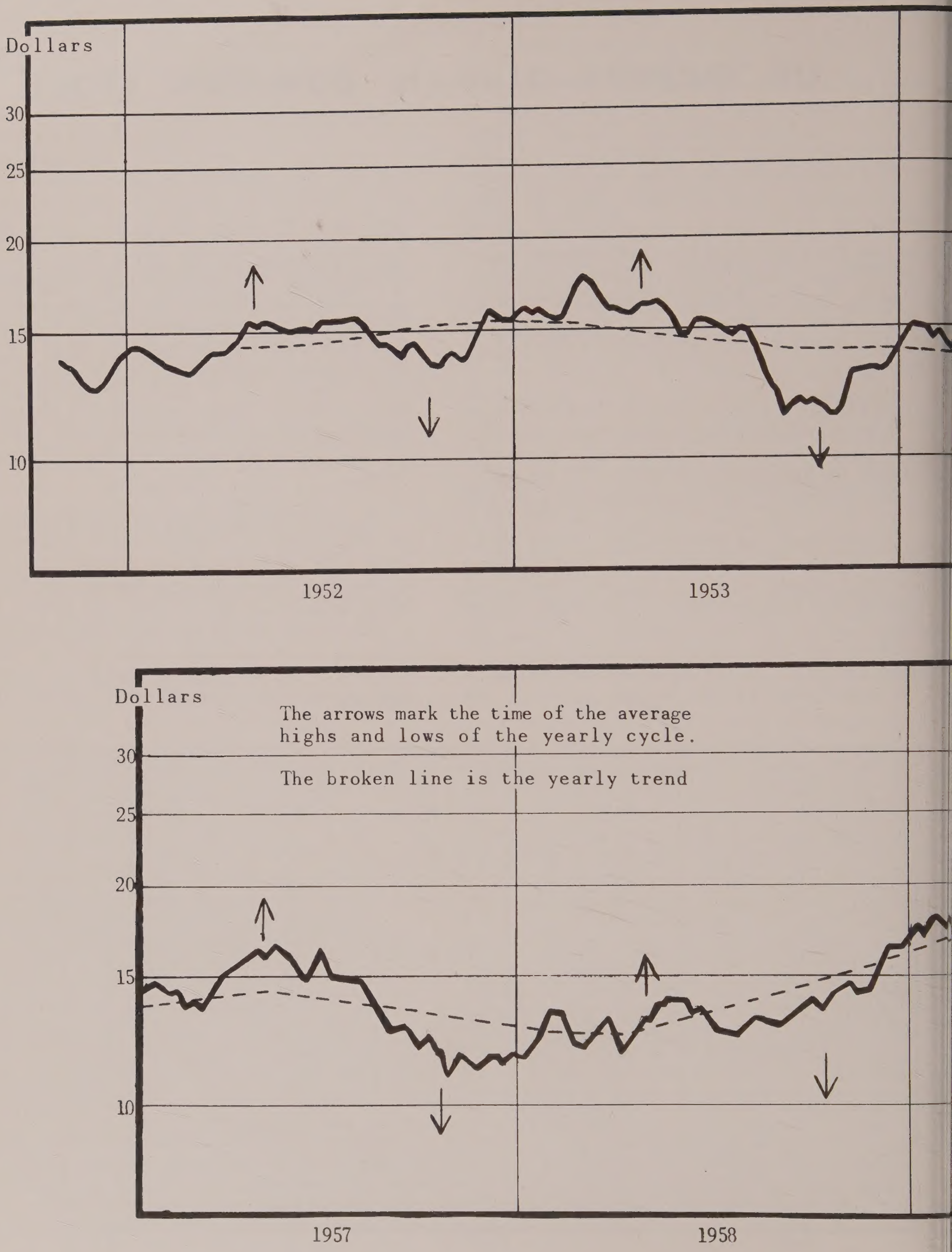
Many factors, including other cycles, will decide the level of the actual price at any given time, as well as the timing of the major turning points in the price line. This cycle is only one of those factors. Nevertheless, it is usually possible to see the yearly cycle in the chart of the data. Figure 2 on the next two pages shows the record since 1951. The cycle peak is missing in the first half of 1960, and the peak looks rather weak in the first half of 1955. Otherwise, it is fairly easy to pick out the yearly peaks and troughs of the cycle over the entire record of the data.

Figure 1 below shows a more detailed record of the price of Fedders since the middle of 1959. The average turning points *of the yearly cycle* are shown by the arrows on Figure 1. Note well that the arrows are *cycle* turning points, and not price turning points. It is just as well that the cycle peak in the early part of 1960 was not matched by a corresponding price peak. This should impress upon you



Arrows mark average yearly cycle highs and lows—not price highs and lows for the year.

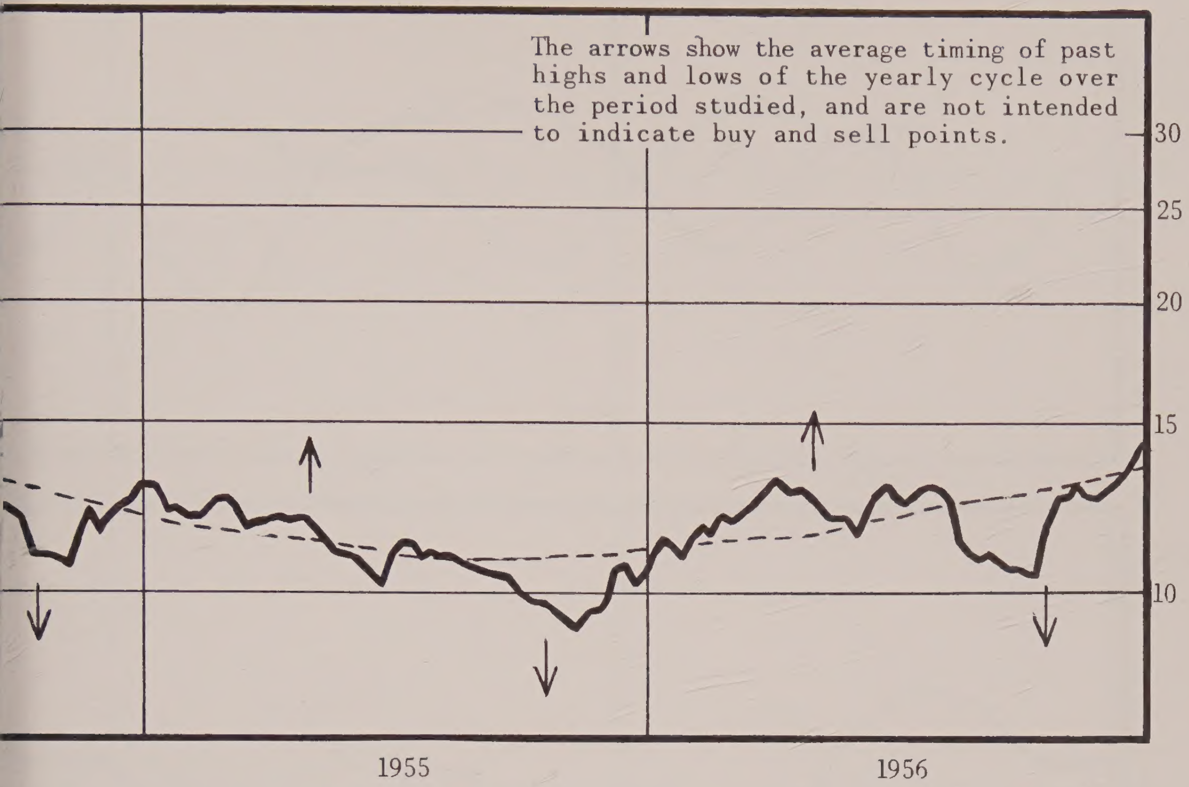
FIG. 1: FEDDERS-QUIGAN—THE WEEKLY HIGH-LOW PRICE



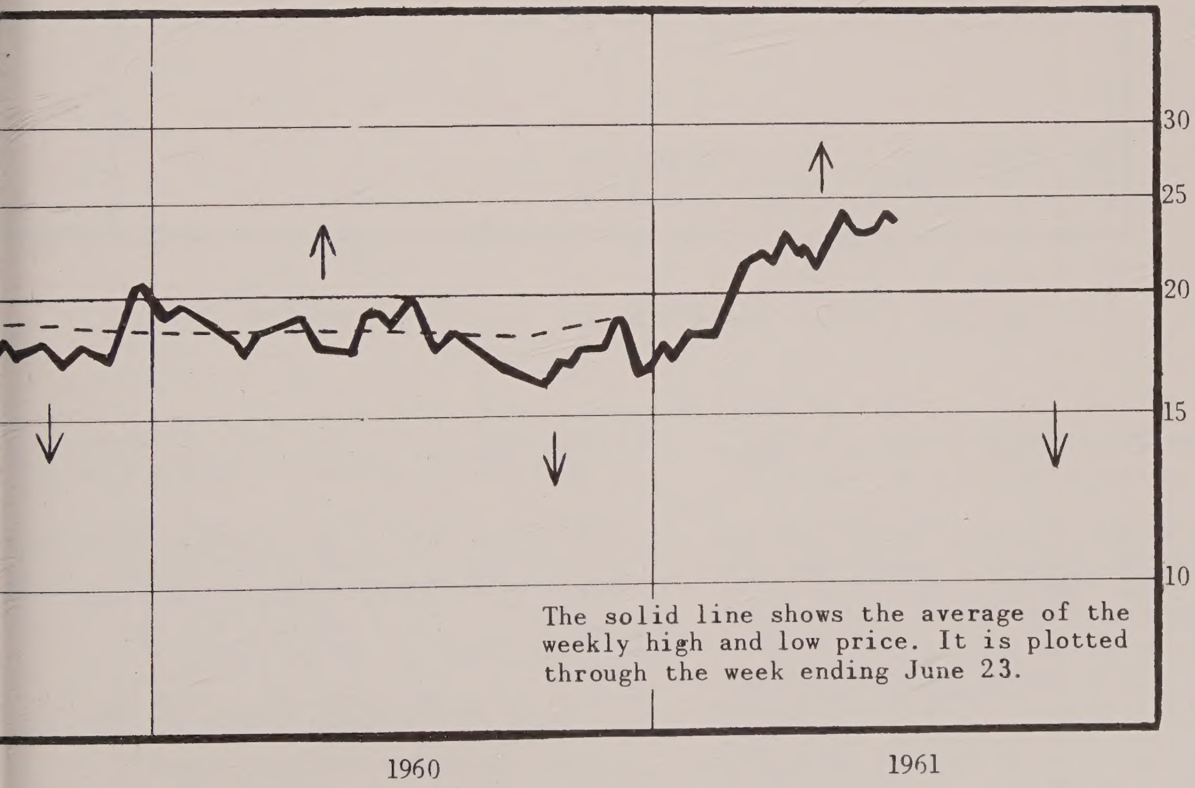
The arrows mark the time of the average highs and lows of the yearly cycle.

The broken line is the yearly trend

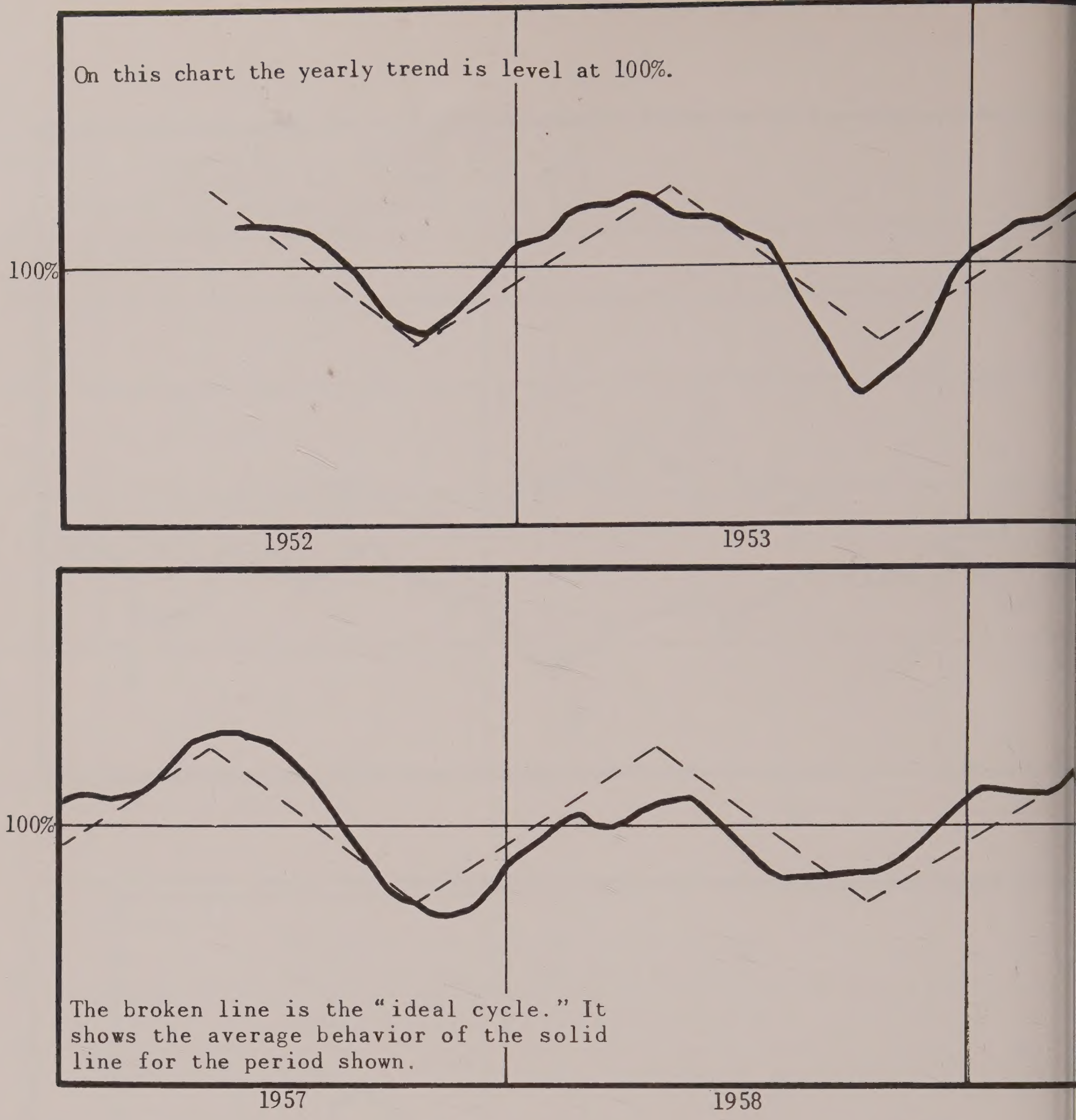
FIG. 2: THE WEEKLY AVERAGE PRICE OF FEDDERS-QUIGAN



The arrows show the average timing of past highs and lows of the yearly cycle over the period studied, and are not intended to indicate buy and sell points.



The solid line shows the average of the weekly high and low price. It is plotted through the week ending June 23.



On this chart the yearly trend is level at 100%.

The broken line is the "ideal cycle." It shows the average behavior of the solid line for the period shown.

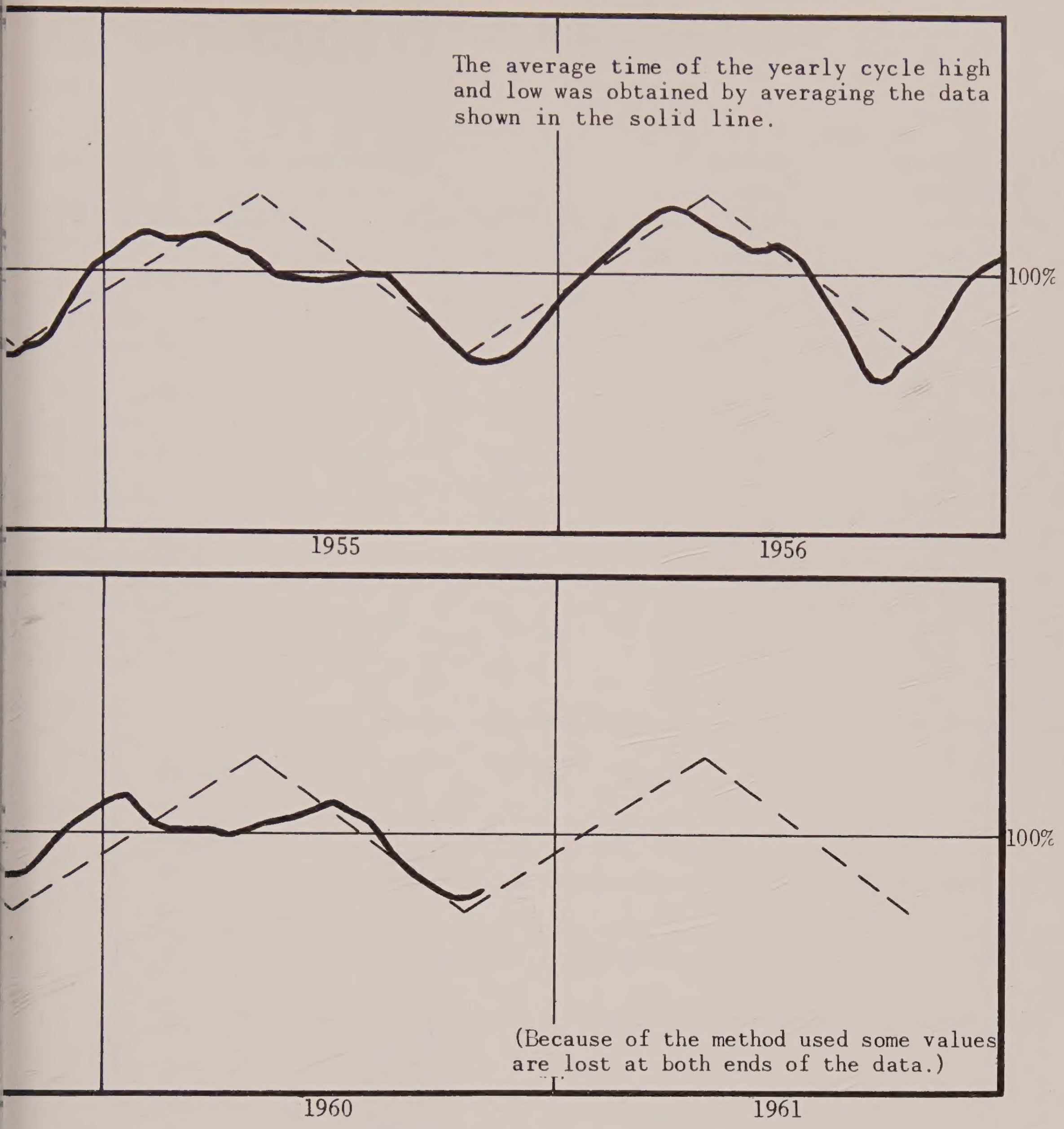
FIG. 3: THE YEARLY CYCLE IN THE PRICE OF FEDDERS-QUIGAN

how important trend, other cycles, and random events are in the final price determination.

An arrow marks the *cycle* low at the week ending October 20, 1961. This low is the first checkpoint in the future to watch for an indication of how well the yearly cycle is continuing to work. At the present time the force of this cycle is downward, but this downward force can be lessened, or even overwhelmed by a strong trend move or a stray random event. Furthermore, even though this cycle has apparently "worked" well since 1951, and even if it is real and significant, there is not any guarantee that it will continue to operat as well in the future as it has in the past.

Although this cycle is dominant enough s that it can be traced on the chart of th prices since 1951, it is even more apparen when the trend is removed, and the cycle i shown separately, as in Figure 3.

On the price chart (Figure 2) the yearl trend is shown as the broken line, and th average highs and lows are marked by the arrows. On Figure 2 the cycle cannot be see as easily in 1959, or 1958, as in 1954, o



1957. That is, the cycle shows more plainly in some years than in others on Figure 2.

However, when trend is reduced to a horizontal line the cycle can be seen very clearly in every year with the exception of the early part of 1960. On Figure 3, the cycle chart, trend cannot confuse the picture because it has been removed from the figures. Trend in Figure 3 is level at 100%. The cycle is seen after it has been separated from the other factors that are included in Figures 1 and 2. For a *cycle* evaluation one should examine Figure 3. This chart shows that the cycle has "worked" to some extent in every year since 1951.

For example, in 1955 the cycle does not show up well on Figure 2. But on Figure 3 it is apparent that the cycle did work in 1955, although the top came very early.

As a practical matter, the average turning points of the cycle are compared to the price of the stock at those times in Table 1 on the next page. Here we see that even when all the other factors are allowed to confuse the picture, the cycle still shows reasonable power.

Table 1
Fedders-Quigan Common Stock

Profit or Loss on Yearly Cycle Only*
1952 - 1961

Date of Cycle Turning Point, Week Ending Friday		Average Weekly Price	Profit or Loss	
			Long Transaction	Short Transaction
High	May 2, 1952	$15.13		
Low	Oct 17, 1952	13.38		$1.75
High	May 8, 1953	16.13	$2.75	
Low	Oct 23, 1953	11.69		4.44
High	May 7, 1954	15.19	3.50	
Low	Oct 22, 1954	10.88		4.31
High	May 6, 1955	11.63	.75	
Low	Oct 21, 1955	9.63		2.00
High	May 4, 1956	12.31	2.68	
Low	Oct 19, 1956	11.63		.68
High	May 3, 1957	16.19	4.56	
Low	Oct 18, 1957	11.81		4.38
High	May 2, 1958	13.13	1.32	
Low	Oct 17, 1958	13.50		-0.37
High	May 8, 1959	20.56	7.06	
Low	Oct 23, 1959	17.50		3.06
High	May 6, 1960	17.56	0.06	
Low	Oct 21, 1960	17.00		0.56
High	May 5, 1961	22.00	5.00	?
Low	Oct 20, 1961			
		Total	$27.68	$20.81
		Total		48.49

*The Yearly cycle is the only factor taken into account here.

Profit and Loss figures are before costs and taxes, dividends on short side, and assume short sales were possible; figures do not include dividends received on the long side.

"KICK-IN-THE-PANTS" CYCLES

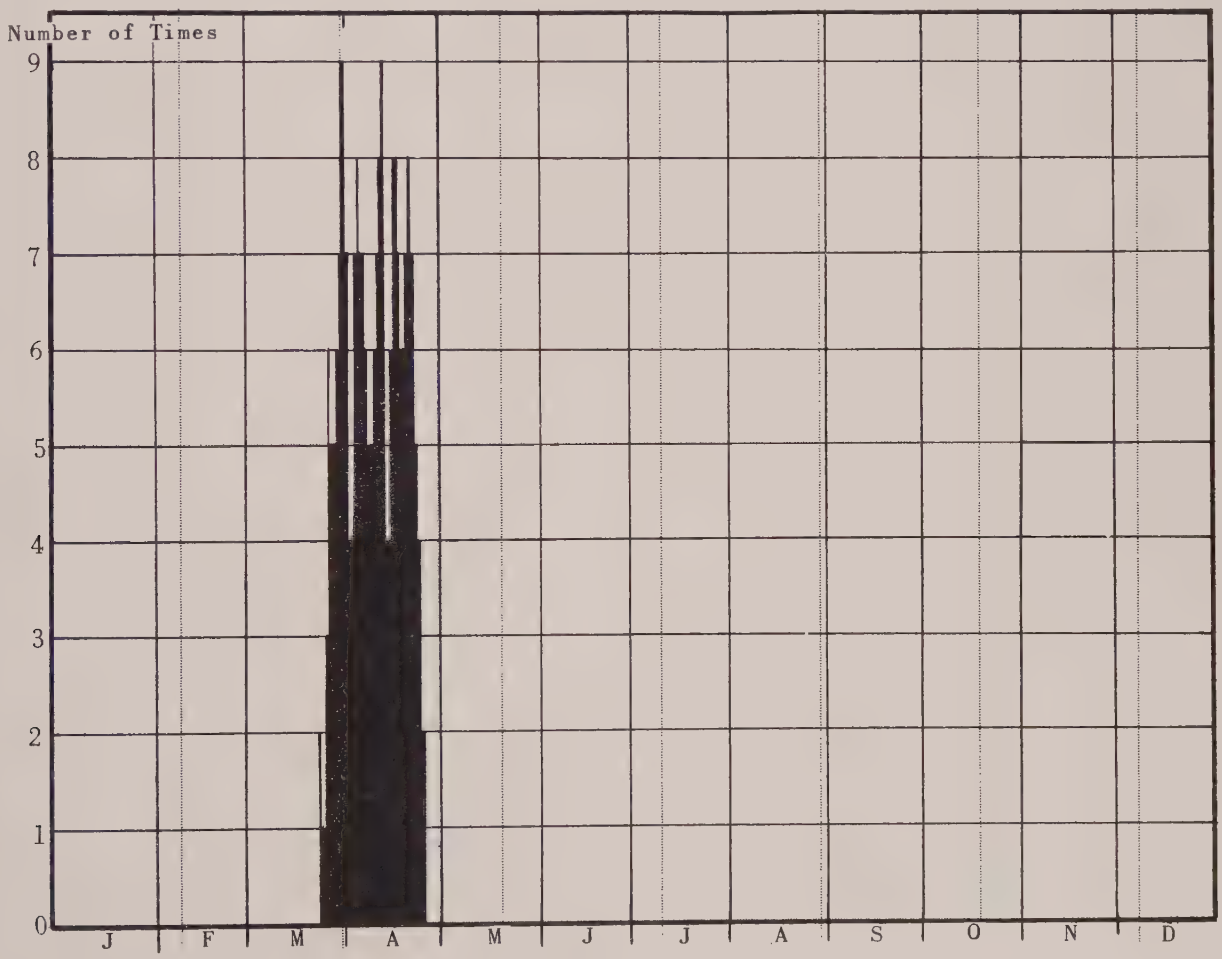
BY E. R. DEWEY

Cycle students commonly regard cycles as perfectly regular periodicities. This perfectly regular pattern is of course distorted by randoms and by other cycles, but basically, it is assumed, it is perfectly regular—*up* for so many months, *down* for so many months, and with an "ideal" time of crest and trough. I think cycle students do this because they don't yet know how to handle the matter any other way.

There is ample evidence that, for at least some cycles, this is not the correct model. Consider a geyser that erupts every hour for one minute. It does not erupt exactly on the hour however. It may erupt early or late. For 55 or 56 minutes the eruption is zero. Then for one minute it is 100 feet, let us say. Then for perhaps 65 minutes it is zero again. Then 100 feet again, and so on. If you averaged a score of eruptions the chart you got would start to rise perhaps five minutes before the hour, reach a peak (much lower than 100 feet) at the hour, and then subside until five minutes after the hour. This isn't the way the real geyser behaves at all. The real geyser reacts as if to a kick in the seat of the pants, applied at *rhythmic* (not exactly periodic) intervals.

Or consider Easter. Easter is one single day that may come anytime (depending on the moon) from March 23rd to April 25th. On all other days of the year Easter is "zero." Yet, if you average 200 Easters you will get a chart that looks like the one below. Easter comes out—on the average—to be a *band*, not a day. This, of course, is quite false.

I incline to the view that many cycles follow the geyser or Easter model, instead of the seasonal temperature model, and that when they do, they should be treated accordingly.



THE OCCURRENCES OF EASTER SUNDAY OVER A 200-YEAR PERIOD

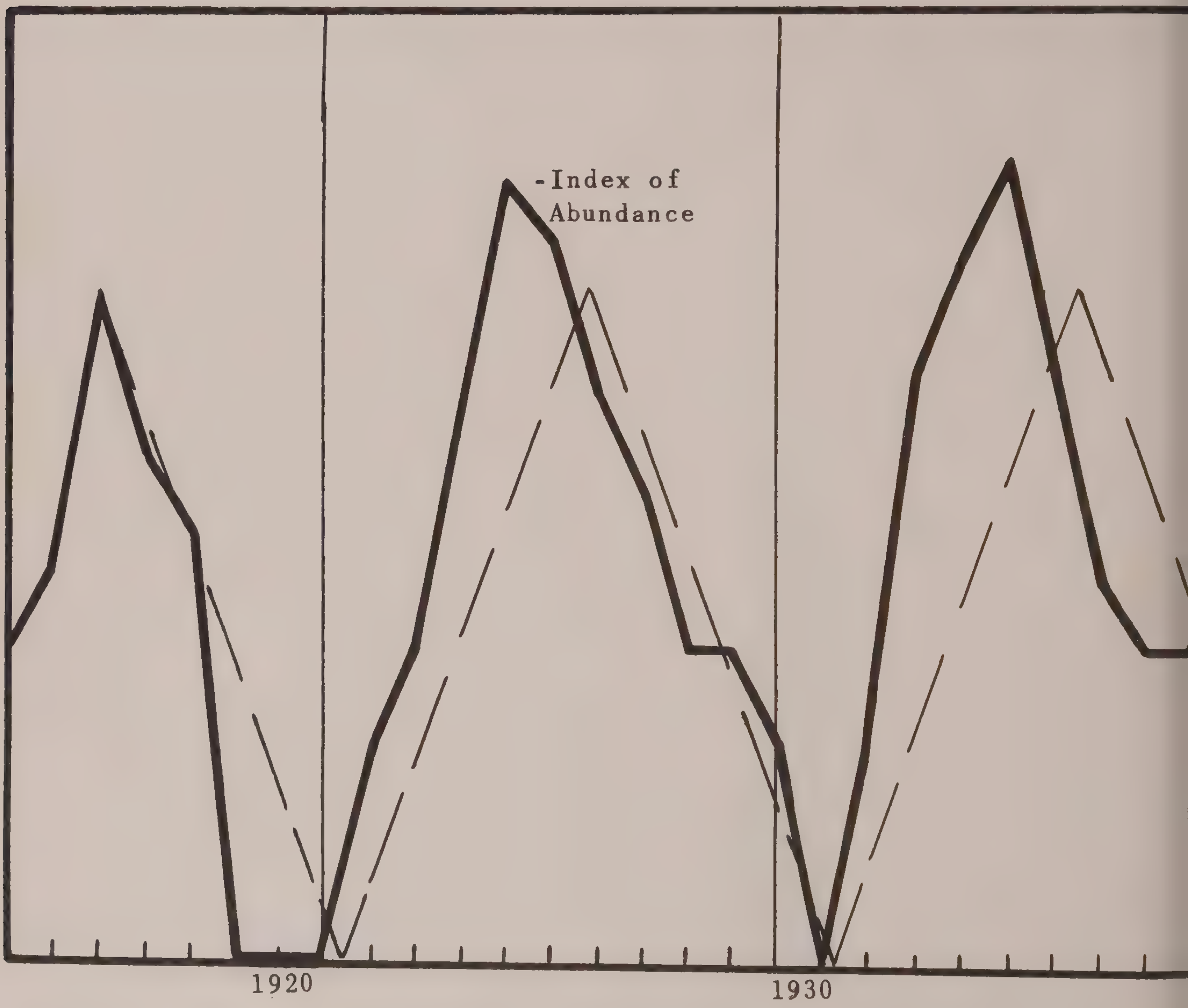
THE ABUNDANCE OF TENT CATERPILLARS

The cycle of the eastern tent caterpillar has apparently just passed a peak (at least in the state of New Jersey), and the suburbanites can stop fussing about those annoying little caterpillars, at least for the next eight or nine years.

Years ago we published the chart of the cycle of abundance of the eastern tent caterpillar. The chart went through the year 1939. Recently we obtained the figures for the period 1939 through 1960 from the New Jersey Agricultural Experimental Station at New Brunswick through the courtesy of Dr. J.B. Schmitt.

The figures are not really the number of caterpillars, they are the number of inquiries received about the caterpillars. The chart below shows an index of the number of letters received by the Station. The chart measures the letter-writing impulse of people as well as the abundance of caterpillars, but it is logical that the most letters would be written in the years of abundance.

At any rate, as was mentioned in the February 1956 issue of *Cycles* when the earlier chart was shown, the record is too short for us to determine the length of the cycle with any degree of accuracy or reliability. But the fact that this cycle—whatever its length—does exist is common knowledge.



AN INDEX OF THE ABUNDANCE OF THE EASTERN TENT CATERPILLAR IN NEW JERSEY

Research by Staff

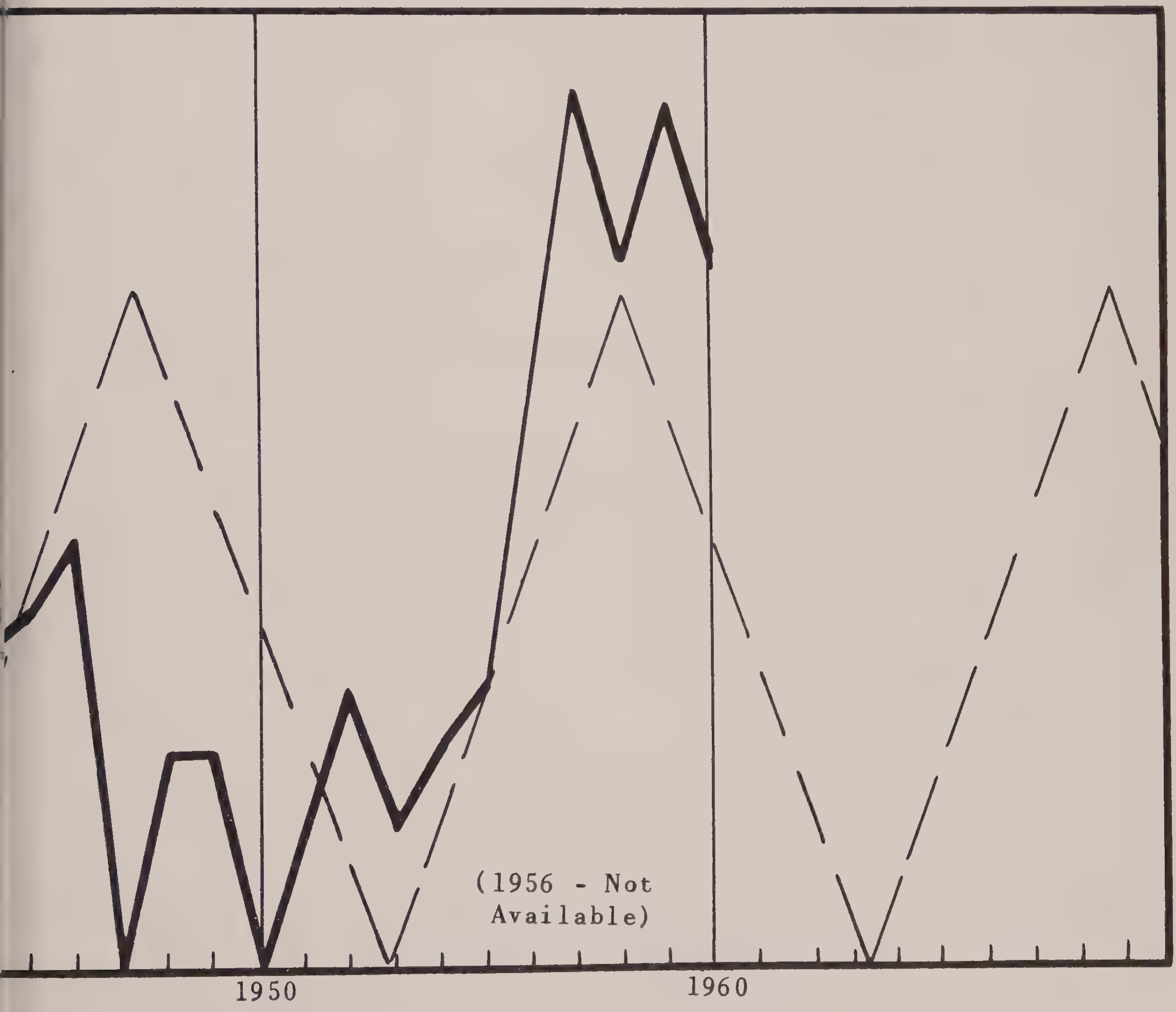
On the chart I added a rigid zigzag line, it the zigzag is just to help the eye. The igzag measures 10.75 years from peak to peak, it this length is not necessarily the length f the cycle. It just fits the curve best from nd to end.

Whatever the true length of the cycle, it s obvious that a peak was missed in the late orties. (Not that anybody cared about missing peak in the abundance of tent caterpillars!) lso, it appears now that the incidence of aterpillars is decreasing from the recent eak. There have been indications that the umber of inquiries for 1961 will be a very mall figure.

The next peak in the zigzag is put on the chart at 1969, but that date is not a forecast date for a year of abundance. All one can say from the short record shown on the chart is that there will probably be another peak in the late sixties.

Although tent caterpillars may fascinate an entomologist, they are just a nuisance to everyone else. Actually, it seems that every one is better off if they just ignore the creatures (unless they get on good fruit trees or ornamentals). Nature takes care of them eventually, as you can see from the chart.

G. S.

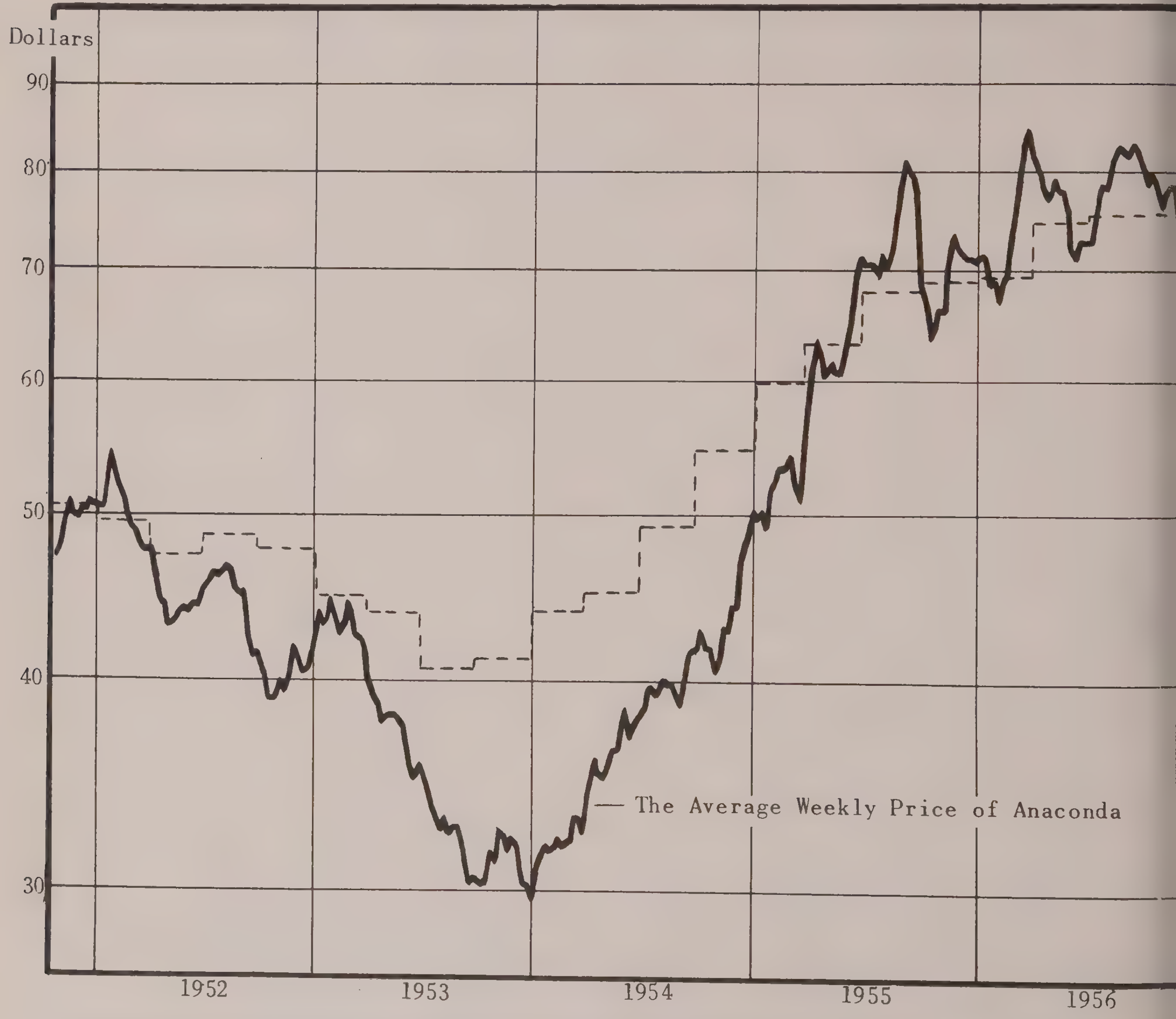


ANACONDA STOCK PRICES
VS THE CYCLES IN S&P'S COPPER SHARES INDE

Anaconda is one of the stocks included in Standard & Poor's Index of Copper Share Prices. It follows that the combined cycle study of Standard & Poor's Copper Shares Index (published in *Cycles*, December 1960) should apply to the price of Anaconda.

The chart below compares these two series of figures: the price of Anaconda and the combination of cycles used in the Copper Share Index story. The average weekly price of Anaconda is recorded by means of the solid line. The broken line shows the quarterly average figures of the combined cycles as found by the anonymous member who did the work.

In 1959 and 1960 the two lines diverged, but it is not to be expected that the lines would match one another indefinitely int the future. Nevertheless both lines showed a low in the final quarter of 1960, followed by a rise in the first half of 1961. The rise that developed in Anaconda was far greater than that indicated by the combined cycle line. Yet the actual rise did not carry prices to the 1959 levels, let alone the 1956 levels.

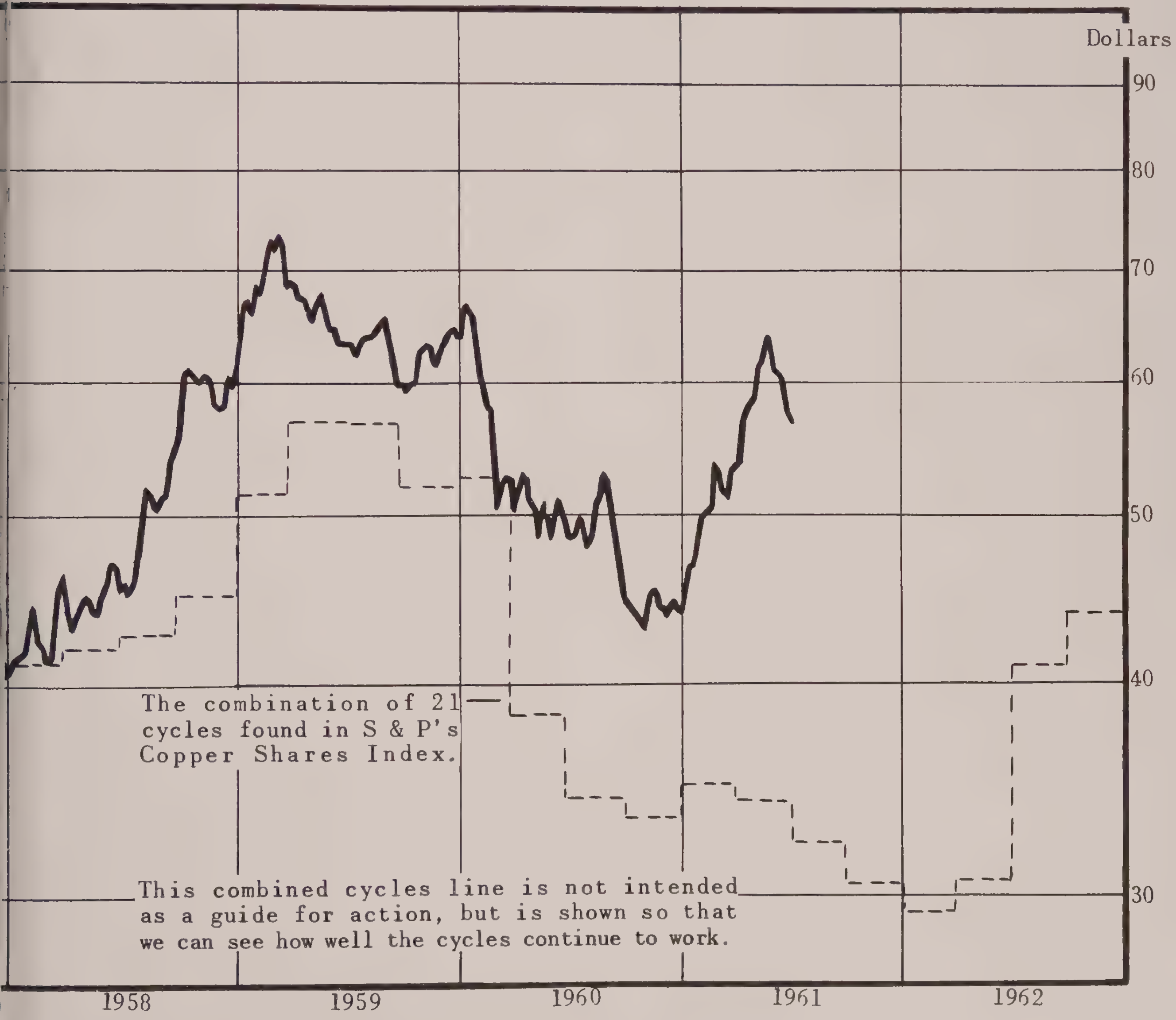


THE PRICE OF ANACONDA COMPARED TO THE COMBINED CYCLES IN S & P'S COPPER t may well be that the combined force of the ossible cycles in these figures being at such very low level kept the actual rise of this pring from developing new highs.

At any rate, the real test of the particlar combination of cycles used in the comined line is yet to come. A low in the comined line is shown for the first quarter of 962. This follows a steady decline in the ombined line. Remember, any agreement between he two lines is general rather than exact. lthough the combined cycle line is shown nto the future it is not intended as a foreast of Anaconda prices, or even as a forecast f Standard & Poor's Copper Shares Index. ven if all the cycles used in the combined ine are real, and even if they all continue o operate (both of which possibilities are nlikely), the price of copper shares will be determined by other factors as well as by the cycles.

You know as well as I do that anything can happen—the price of copper shares can start to go up and keep on going up so that no softness at all develops to match the low shown by the combined cycle line in early 1962. In fact, any continued correspondence between the two lines will be almost surprising.

One point in particular that I want to emphasize—the level of the low on the combined line in the first quarter of 1962 is not meant as an indication of the price of Anaconda. It says only that the *combined cycles* in the copper shares index may have a low about then. The cycles line is not intended as a guide for action—it is shown only so that we can check how well the cycles work. *G. S.*



LETTERS:

Pro and Con

Although some of your reports are over my head, the subject is a very interesting one, and I think you are doing a fine job.

Newmarket, New Hampshire L. H. G.

* * *

You have too many charts full of sound and fury, but signifying nothing. Anybody can chart the past—but what about the future?

New York, New York A. B. F.

* * *

I have been a member of the Foundation for many years, and look forward each month to getting *Cycles*, and especially the Geisinger Indicator.

Chatahoochee, Florida J. C. G.

The Foundation

Gentlemen:

Do you have any material which would help to acquaint new readers with the origin, background, and purposes of your organization?

Irving, Texas Raymond A. Smith

Comment: I am sorry we do not have any prepared material to acquaint new readers with the origin, background, and purposes of the Foundation. However, you may be interested in knowing that the Foundation was incorporated as a not-for-profit corporation in the State of Connecticut in 1940.

The first regular publication of *Cycles* was in June, 1950 and it has been published monthly since then. At the present time we have about 5,500 members.

All our work is really about cycles, per se, but the work divides into two segments: basic research and applied research. The basic research has nothing to do with any practical application. It is the pursuit of cycle knowledge on a scientific basis —just to get the knowledge. The applied research is directed toward publication in *Cycles* and is intended to have some practical (although not direct) application. For instance, if we find a short cycle in egg prices we publish that information. Of course other factors also affect egg prices. But if you are forecasting egg prices, you should know about any possible cycles—in addition to the other factors. We do not forecast egg prices—our job is to inform the public of any cycles that might be present.

G. S.

Footnote to the Director's Letter

The following tabulation gives the world population in the terms in which it is spoken of in this month's "Director's Letter" on pages 191 and 192.

Area	Population	On a "Patriarchal" Basis
North America Ex. U.S.A. and Canada	66,000,000	16
South America	137,000,000	34
Africa	236,000,000	59
Asia Ex. Japan	1,531,000,000	383
Oceania, Ex. Australia	6,000,000	1
SUB-TOTAL	1,976,000,000	493
U. S. A.	177,000,000	44
Canada	18,000,000	5
Australia	10,100,000	3
Japan	93,000,000	23
Europe	421,000,000	105
Russia	210,500,000	52
SUB-TOTAL	929,600,000	232
GRAND TOTAL	2,905,600,000	725

Time and time again. . .

BY GUSTAV GUMPERT

MD magazine, a monthly journal for physicians, talks about cycles in the June issue. Entitled "Rhythm of Life," the article describes a number of biological cycles that are worth mentioning here.

"Recently discovered," the article states, "are several rhythms that govern blood pressure and flow in the body, independent of pulse rhythm; one rhythm, with a period of 12 seconds, synchronizes blood pressure with respiration."

Blood pressure and blood flow are also cyclical. At about 3 o'clock in the morning blood pressure is low; by 3 o'clock in the afternoon it is high.

During the early morning hours, urinary potassium, sodium and chloride are highest, then decrease slowly; hydrogen ions and phosphate first fall, then rise. These cycles occur during continued rest, continued activity, while fasting, while eating controlled diets at normal or at hourly intervals, with and without sleep.

Some other rhythms of the body include the following: the liver produces bile only during the day, when it also breaks down glycogen; at night it stores glycogen; lung vital capacity decreases at night; adrenal secretions are low in the morning, rise during the day.

MD also makes this interesting comment about the time cycle for death: "Although death respects no man, it seems to respect time: statistics show that deaths from acute infection tend to occur at about 4 o'clock in the morning, whereas death from tuberculosis occurs more frequently late in the afternoon." At the period of the full moon, significantly more men die than women; deaths from TB and heart trouble reach a peak just after the full moon.

The article concludes: "All God's chillun got rhythm."

Periodic Disease

Along the same lines, *Spectrum*, a medical journal published by Pfizer, reports that many diseases occur in cycles.

The article opens with this comment: "The patient who drifts from doctor to doctor with a description of intermittent symptoms may not be a malingerer but may be suffering from one of the seldom recognized cyclic diseases."

The recurrent symptoms of epilepsy, malaria and brucellosis, as well as the seasonal outbreaks of hay fever, polio, and other disease, are familiar to doctors and are recognized and treated. But the patient with an unfamiliar illness characterized by a cyclic pattern is usually less fortunate. Such illnesses have been given the name "periodic disease." They are frequently marked by cyclic attacks of fever, pain in the joints, abdominal pain or nausea. Fortunately, although temporarily disabling, they are rately fatal.

Short Cut to Biorhythm

The New York *Mirror*, in its edition of April 9, 1961, tells the story of Biorhythm in brief and gives a short way of calculating your own cycles. Readers of this column will recall our various reports on this technique for following the alleged 23, 28, and 33-day cycles in physical, emotional and intellectual well-being.

Although the scientific validity of biorhythm still requires verification, our own experience with the charts indicates that, since November 1, 1960, more than 90% of our own accidents and illnesses have occurred on critical biorhythm days. But that's just one person's experience. *Cycles* would be glad to know about your reactions, too.

Market Comment

The nearly six-month's test of our cycle method of predicting fluctuations in the market averages has shown some success. Unfortunately, however, the signals, due to publication problems, never come out in advance of *Cycles*. This is obviously not much help to readers. We are now working on a method of longer range prediction, which we can hopefully introduce in this column in the near future.

The Cycle Round-Up

A REVIEW OF HOG PRICE CYCLES

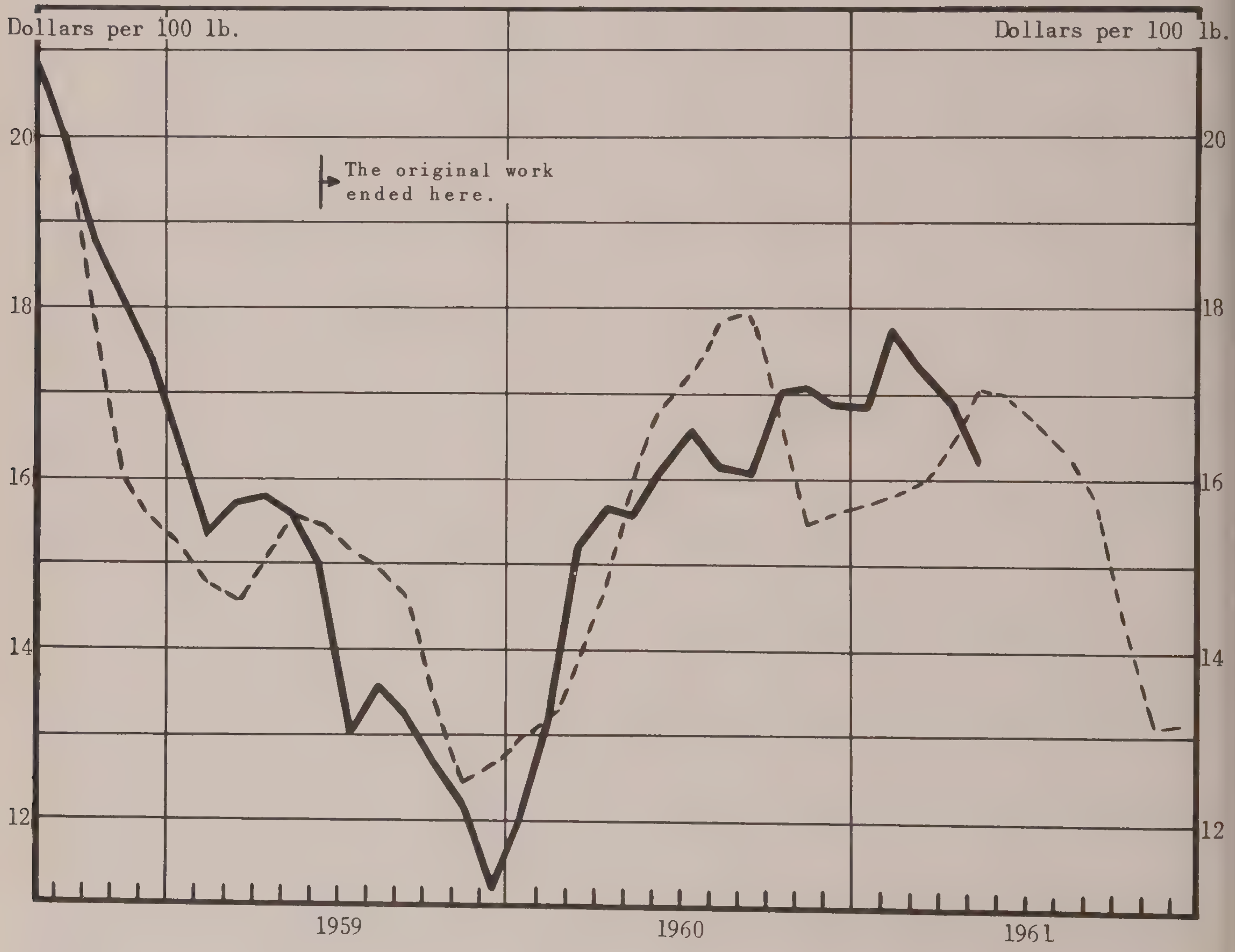
There are two cycles included in the combined cycles and trend line on the chart below. One cycle is 38.2 months long, and the other is 12 months long.

The 38.2-month cycle had a typical low in March 1959, followed by a typical high in October 1960. It now appears that the actual 38.2-month cycle low came at least five months after the typical date in 1959. Apparently the 1960 actual cycle high is also going to be later than the ideal time for it.

The 12-month cycle has a typical low in November and December of each year, and a high in June and July. The high price of hogs at the end of 1960 is contrary to the normal seasonal pattern, but a late top in the 38.2-month cycle could account in part for the unusual strength in hog prices.

The combined cycle line drops off toward the end of 1961 because of the decline in both the typical 38.2- and 12-month patterns. (The trend is relatively level at $15.50.) If the top of the 38.2-month cycle is further displaced, or if the trend level changes, the price of hogs may follow a course different from the combined line. The passage of two or three more months should help to clarify this situation.

G. S.



THE PRICE OF HOGS (ALL GRADES) AT CHICAGO

The Cycle Workshop

LOGARITHMS AND FINDING CYCLES

In making a cycle analysis you usually proceed along a fairly routine track. First, plot the data on semi-log paper, or plot the logarithms of the data on arithmetic paper. Then examine the curve for evidence of possible cycles. So far in this series we have discussed the types of chart paper, arithmetic and semi-log. Before we start talking about how to look for cycles, we should say something about logarithms for the benefit of those of you who may have forgotten high school mathematics.

You will remember that in plotting the data on semi-log paper, the resulting curve showed equal percentage differences as equal distances on the chart. You get the same result if you plot the logarithms of the data on arithmetic paper—equal percentages changes will show up as equal distances on the chart.

So one of the first steps in the work is to look up the logs of the data. For this step you need a table of logarithms, and one can be found in almost any elementary book on mathematics or statistics. These tables, and the logarithms that we use are common logs, that is logs to the base 10.

A logarithm is an exponent. It is the power to which 10 must be raised to equal the number. For example, $10^1 = 10$. And $10^2 = 100$. Therefore, the logarithm of 10 is 1.000, and the logarithm of 100 is 2.000. The logarithm of any number between 10 and 100 is between 1.000 and 2.000. The 1. and 2. are the characteristics of the logarithm. The characteristic of a log is to the left of the decimal point and shows the number of digits to the left of the decimal point in the number. The characteristic you have to compute yourself. If you have one digit left of the decimal point in the number, the characteristic is 0. If you have two digits to the left of the decimal point, the characteristic is 1. If you have three digits to the left of the decimal point in the number, the characteristic is 2. The characteristic is always one less than the number of digits to the left of the decimal point in the number.

The part of the logarithm to the right of the decimal point is the mantissa. It is the mantissa that you look up in the table of logarithms. The mantissa depends on the digits in the number, and the order in which they occur, without regard for the decimal point. If the digits are the same, and come in the same order, the mantissa will be the same regardless of where the decimal point in the number is. For example:

the log of 1.128 is 0.0523
the log of 11.28 is 1.0523
the log of 112.8 is 2.0523
the log of 1128. is 3.0523

The characteristic changes as the decimal point changes. The mantissa is the same in all cases. If you have the number with the digits 1128 in that order the mantissa is .0523 regardless of where the decimal point is in the number. You look up the number 1128 in the table of logarithms for the mantissa.

Another example of numbers and the corresponding logarithms follows:

For the number	100 the log is	2.0000
	101	2.0043
	102	2.0086
	110	2.0414
	199	2.2989

In this case the characteristic did not change because there were three digits to the left of the decimal point in the number in each example. Up to and including the number 999, the characteristic remains 2.

There are many other points to mention about logarithms, but this should be enough to get you started. Ordinarily we use three place logs. Also, if the numbers you are looking up are too long for the numbers recorded in the table, you have to interpolate between the logs to get an accurate reading.

There is a logarithm for every positive number. It follows that there is a corresponding number for every logarithm. If you have a log, and want the number, you just look up the mantissa in the table, and get the corresponding number. Then you place the decimal point in the number according to what the characteristic of the log is.

Logarithms are very useful for shortening the amount of work involved in certain types of operations. Because of the laws of exponents (and logarithms are exponents), logs have certain properties. These are:

1. Instead of multiplying two numbers, you can add the logs of the numbers. The sum of this addition is the logarithm of the number you want. You look up the anti-logarithm, and the answer is the product you would obtain by multiplying the numbers.

2. Instead of dividing two numbers, you can subtract the logarithms. The remainder is the logarithm of the number which is the quotient.

3. To raise a number to a given power, you just multiply the log of the number by the given power, and you get the log of the number (raised to that power).

4. To extract the root of a number, you just divide the logarithm of the number by the desired root, and you have an answer which is the log of the desired root.

Any good elementary textbook on mathematics will give you a quick synposis on logarithms. From the standpoint of cycle analysis, if you have access to modern calculating machines, with automatic multiplying and dividing, the use of logs is not too essential. The raising of numbers to powers (multiplying them by themselves) is not often needed. But for computing geometric moving averages, a frequent operation in cycle analysis, logarithms are essential.

The Next Step

If you are making a cycle analysis, you proceed by lining up a homogeneous series of figures, then looking up the logarithms of the data, and then plotting the logarithms on arithmetic paper. If you are not too sure that you are going to find any cycles, you can first plot the data on semi-log paper, and examine that chart for evidence of possible cycles. If you see the possibility of cycles, then you can proceed to look up the logs. But, in some instances you might be pretty sure of what you are going to find, in which case you would probably look up the logs before plotting. For example, if you are in the cotton textile business, you are well aware of the two-year cycle in that business.

The cycle analysis starts with an inspection of the chart of the data (or of the logs of the data). All that has been said so far in this series of articles is preliminary to the actual work of cycle analysis. *The first step in the analysis is to examine the chart carefully for hints of cycles.* Spread the chart flat and look for areas of strength and areas of weakness.

There are several visual aids which I use to help me in an inspection of a chart. They are pencils, thumbing, counting, the graduated scale, and the time chart. All of these devices are just aids in finding clues to cycles that may be present. They help you find areas of strength and weakness. Each one will be discussed and illustrated separately.

At this point you are looking only for clues—you need a hint of what may be present before you can proceed with the next step in the analysis. Except for the time chart, all the techniques are simple.

It is possible to scan a series of figures for hints of possible cycle lengths by the use of more sophisticated techniques such as harmonic analysis, but I am deliberatly keeping the discussion simple at this point. The use of harmonic analysis will be explained later.

Pencils

It is sometimes helpful as a starter to put pencils on the chart at the most promising peaks (or troughs). Move the pencils about until they look more or less equidistant from each other. This sounds like a most elementary approach, but you will find that it helps to orient you to the measurement of reasonably regular horizontal distances. Also it provides a ruler that can be changed at will.

The discussion of other techniques for finding hints of cycles, and the succeeding steps in the analysis will follow in later installments. *E. R. D.*

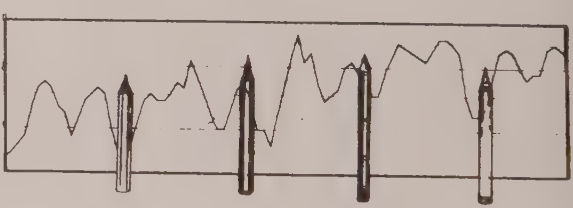


Fig. 1. Pencils may be laid on apparent areas of high and low to aid the eye in noting possible rhythm and wave length. The several pencils mark off areas of high and indicate a possible 18-year cycle. (This curve is a constructed one having a strong 18-year cycle along with 7, 5, 8, 0, and 10.0-year cycles.)

THE GEISINGER INDICATOR

The Indicators go up:

The turn in the Indicators which was reorted in my letter of May 24 has been followd by sharp rises. The Geisinger Indicator rossed the zero line into plus territory, and based on the figures for the month of May) tood at 0.4 in February (October when adanced).

The First Difference Indicator went up to .33 for April.

The Modified Geisinger Indicator went up o -0.43 in February (October when advanced).

Actual production as measured by the Fedral Reserve Board's seasonally adjusted Index f Production was up in May to 164. Although this increase represents a rise of 5.8% from the January-February-March bottom, it is still below the higher levels of early 1960. A large part of the dip of 1959—1960 has been recovered, but there is still a good distance for production to climb before business could be called booming.

The rise in the Indicators gives us reason to hope that we will soon be on firm ground. In fact, for the first time since the middle of 1959 it is a physical possibility that the Geisinger Indicator could reach plus 2.00 next month. Very high production levels have always followed the plus 2.00 signal.

June 28, 1961 E. R. Dewey

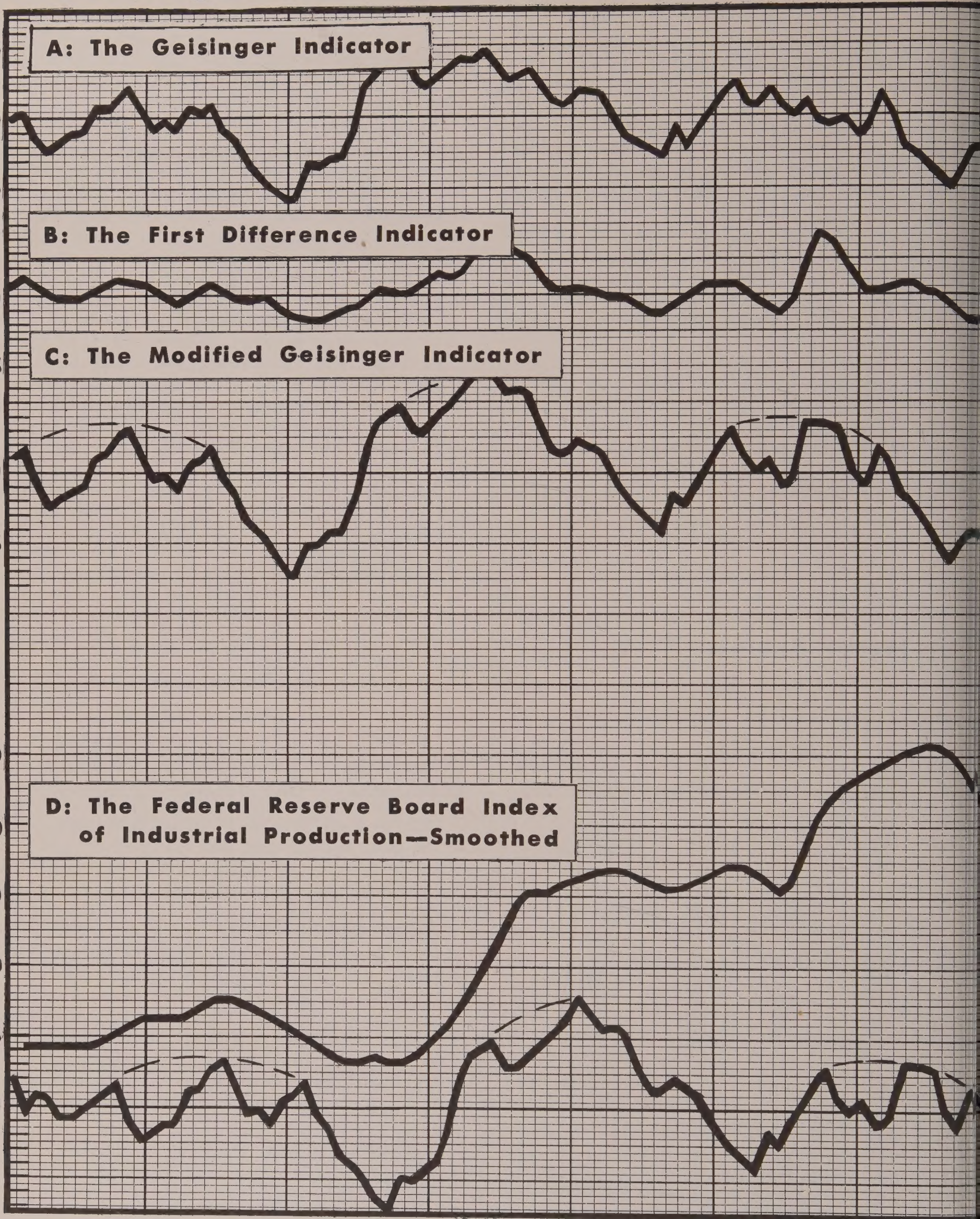
The recent figures:

Month	F.R.B. Index	Geisinger Indicator	First Difference Indicator	Modified Geisinger Indicator	Timing Advanced 8 Months
Jul-1960	166	0.00	-0.17	-0.17	1961-Mar
Aug	165	-2.20	-1.00	-3.20	Apr
Sep	162	-3.00	-1.50	-4.50	May
Oct	161	-2.40	-1.83	-4.23	Jun
Nov	159	-2.60	-2.00	-4.60	Jul
Dec	156	-3.20	-2.00	-5.20	Aug
Jan-1961	155	-2.20	-1.67	-3.87	Sep
Feb	155	0.40	-0.83	-0.43	Oct
Mar	155	*	0.67r	*	Nov
Apr	160r	*	2.33p	*	Dec
May	164p	*	*	*	1962-Jan

r - revised; p - preliminary; * - not yet available

The chart: See the next two pages

The Geisinger Indicator Compared To Indust



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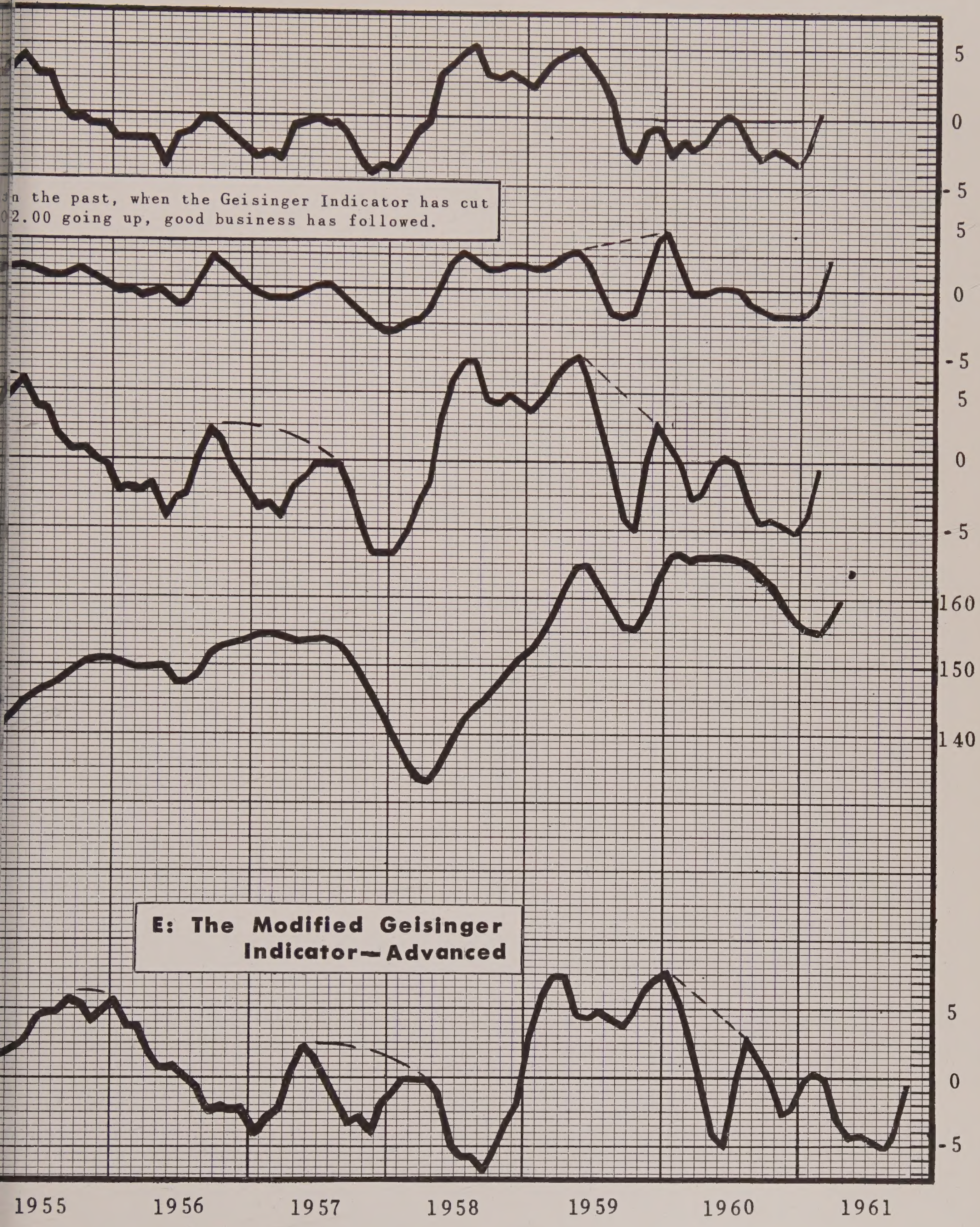

n the past, when the Geisinger Indicator has cut 2.00 going up, good business has followed.

E: The Modified Geisinger Indicator—Advanced

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